PRELIMINARY EFFLUENT LIMITS

UNNAMED TRIBUTARY TO FOUNTAIN CREEK AND FOUNTAIN CREEK

FROM

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LOWER FOUNTAIN METROPOLITAN SEWAGE DISPOSAL DISTRICT (LFMSDD)

Table 1 Assessment Summary	
Name of Facility	LFMSDD WRF
PEL Number	PEL- 200285
Stream Segment - WBID	1. Arkansas River Basin, Fountain Creek Sub-basin, Stream Segment 04: All tributaries to Fountain Creek which are not within the boundaries of National Forest or Air Force Academy lands, including all wetlands, lakes and reservoirs, from a point immediately above the confluence with Monument Creek to the confluence with the Arkansas River, except for the specific listings in segments 5, 6 and 7a and 7b. COARFO04 2. Arkansas River Basin, Fountain Creek Sub-basin, Stream Segment 02a: Mainstem of Fountain Creek from a point immediately above the confluence with Monument Creek to a point immediately above the State Highway 47 Bridge. COARFO02a
Classifications	Warm Water Aquatic Life Class 2 Recreation Class E Existing Primary Contact Use Agriculture Water supply (only *WBID Stream Segment COARFO02a*)
	COARFO04 - Use Protected (Based on July 17, 2008 WQCC Decision) COARFO02a - Undesignated

I. Introduction

This preliminary effluent limits (PELs) evaluation for the Lower Fountain Metropolitan Sewage Disposal District (LFMSDD) Harold D. Thompson Regional Wastewater Reclamation Facility (WRF) was developed for the Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Division (WQCD). The evaluation was conducted to facilitate issuance of PELs by the WQCD for the proposed LFMSDD WRF for pollutants found to be of concern.

Figure 1 contains a map of the study area evaluated as part of this PEL development.

(Separate map provided by GMS, Inc. available upon request.)
Fig 1

The LFMSDD WRF proposes to discharge to an unnamed tributary to Fountain Creek, which then flows approximately 1.5 miles before its confluence with the mainstem of Fountain Creek. The design capacity for the proposed LFMSDD WRF is 2.5 mgd (3.9 cfs). The ratio of the chronic annual low flow of the unnamed tributary to the proposed LFMSDD WRF design capacity is 0 to 1 and the ratio of the chronic annual low flow of Fountain Creek to the proposed LFMSDD WRF design capacity is approximately 15 to 1.

The region in which this facility will be located is highly urbanized with a growing population and therefore the assimilative capacities in Fountain Creek are highly influenced by numerous domestic wastewater treatment plants. Within a 12.5 mile segment of Fountain Creek, the Colorado Springs WWTF (CO-0026735), Security Sanitation District WWTF (CO-0024392), Fort Carson WWTF (CO-0021181), Widefield Water and Sanitation District WWTF (CO-0021067) and Fountain Sanitation District WWTF (CO-0020532) all discharge to Fountain Creek or its tributaries at points upstream of the proposed LFMSDD WRF location. The confluence of the unnamed tributary that will be the receiving stream for the LFMSDD WRF with Fountain Creek is approximately 4.7 miles downstream of the Fountain Sanitation District WWTF, which is currently the furthest downstream domestic WWTF discharge in the study area. With the exception of the Fort Carson WWTF, which exclusively serves the US Army base of Fort Carson, these facilities are domestic wastewater treatment plants.

Segment 02a of Fountain Creek is a transitional stream that travels from urban, Front Range foothills to the plains. The hydrology varies from extreme floods to periods of very low flows. The stream carries a high load of sediment due to erosive geologic formations in the watershed and flood plain. In the majority of Segment 2a, the streambed is comparatively fine-grained, mobile alluvial sediment. Stream segment COARFO02a of the Fountain Creek Basin is currently identified on Colorado's 303(d) list of water quality impacted streams for E. coli. This segment of Fountain Creek is also included on Colorado's Monitoring and Evaluation List, Regulation 94, as a water quality impacted stream for selenium. This stream segment also contains relatively high concentrations of iron in the total recoverable form. As all of these parameters are pollutants of concern for the LFMSDD WRF they are included in this PEL evaluation.

As a naturally occurring tributary to Fountain Creek, the unnamed tributary is designated as part of stream segment COARFO04. However, at the point 1.5 miles downstream from the LFMSDD WRF where the unnamed tributary flows into the mainstem of Fountain Creek, the stream segment is identified as COARFO02a and the in-stream water quality standards become more stringent.

In order to be protective of quality, two sets of assimilative capacities for the LFMSDD WRF were developed. The first set is based on the in-stream standards for stream segment COARFO04 and the second set is based on the in-stream standards for stream segment COARFO02a. Due to the proximity and because the receiving stream is composed almost exclusively of the upstream facilities' contributions during times of low flow, the upstream facilities were modeled in conjunction with the proposed LFMSDD WRF when determining available assimilative capacities in Fountain Creek. The multi-user modeling of Fountain Creek completed as part of this PEL analysis is consistent with previous analyses for the other Fountain Creek dischargers. The assimilative capacities for the two sets were compared, pollutant by pollutant, and the most stringent was applied as the PEL.

Information used in this assessment includes data gathered from the Colorado Springs WRF, Security Sanitation District WRF, Fort Carson WRF, Widefield Water and Sanitation District WRF, Fountain Sanitation District WRF, WQCD, US Environmental Protection Agency (EPA) and the US Geological Survey (USGS), as well as previous modeling of Fountain Creek conducted by the WQCD. The information used in this evaluation consists of the best information available at the time of preparation of this PEL analysis.

II. Water Quality

A. Stream Segment Water Quality Standards

The proposed LFMSDD WRF will discharge to the Water Body Identification (WBID) stream segment COARFO04, which means the Arkansas River Basin, Fountain Creek Sub-basin, Stream Segment 04. This segment is composed of, "All tributaries to Fountain Creek which are not within the boundaries of National Forest or Air Force Academy lands, including all wetlands, lakes and reservoirs, from a point immediately above the confluence with Monument Creek to the confluence with the Arkansas River, except for the specific listings in segments 5, 6 and 7a and 7b." Stream segment COARFO04 is classified for Warm Water Aquatic Life Class 2, Recreation Class E Existing Primary Contact Use, and Agriculture.

Statewide Basic Standards have been developed in Section 31.11(2) and (3) of *The Basic Standards and Methodologies for Surface Water* to protect the waters of the state from radionuclides and organic chemicals. In Section 31.11(1) of the regulations, narrative standards are applied to any pollutant of concern, even where there is no numeric standard for that pollutant. Waters of the state shall be, "free from harmful substances in harmful amounts." Total dissolved solids (TDS) and sediment are such pollutants of concern being discussed by Agricultural and Water Quality Standards workgroups. In order to protect the Basic Standards in waters of the state, effluent limitations with monitoring, or "monitoring only" requirements for radionuclides, organics, TDS, or any parameter of concern could be put in Colorado Discharge Permit System (CDPS) discharge permits. For this PEL analysis, no additional parameters have been identified based on the individual or narrative standards contained in Regulation 31.

Numeric standards are developed on a basin-specific basis and are adopted for particular stream segments by the Water Quality Control Commission. To simplify the listing of the segment-specific standards, many of the aquatic life standards are contained in a table at the beginning of each of the regulations. The standards in Tables 2A and 2B have been assigned to stream segments COARFO04 and COARFO02a, respectively, in accordance with the *Classifications and Numeric Standards for Arkansas River Basin.*

Table 2A **In-stream Standards for Stream Segment COARFO04**
Physical and Biological
Dissolved Oxygen (DO) = 5 mg/l, minimum
pH = 6.5 - 9.0 su
E. coli chronic = 126 colonies/100 ml
Inorganic
Un-ionized Ammonia acute and chronic = old TVS, Type I Temp. Mod. (Exp. Date 12/31/2012)
Free Cyanide acute = 0.2 mg/l
Boron chronic = 0.75 mg/l
Nitrite acute = 10 mg/l
Nitrate acute = 100 mg/l
Metals
Total Recoverable Arsenic chronic = 100 µg/l
Total Recoverable Beryllium chronic = 100 µg/l
Total Recoverable Cadmium chronic = 10 µg/l
Total Recoverable Trivalent Chromium chronic = 100 µg/l
Total Recoverable Hexavalent Chromium chronic = 100 µg/l
Total Recoverable Copper chronic = 200 µg/l
Total Recoverable Lead chronic = 100 µg/l
Total Recoverable Nickel chronic = 200 µg/l
Total Recoverable Selenium chronic = 20 µg/l
Total Recoverable Zinc chronic = 2000 µg/l

Footnotes: mg/l = milligrams per liter
su = standard units
ml = milliliters
TVS - Table Value Standard
µg/l = microgram per liter

At a point approximately 1.5 miles downstream of the LFMSDD WRF discharge, the unnamed tributary into which the proposed WRF discharges enters Fountain Creek. Fountain Creek at this point is part of segment COARFO02a. Stream segment COARFO02a stands for the Arkansas River Basin, Fountain Creek Sub-basin, Stream Segment 02a. This segment is composed of the, "Mainstem of Fountain Creek from a point immediately above the confluence with Monument Creek to a point immediately above the State Highway 47 Bridge." Stream segment COARFO02a is classified for Warm Water Aquatic Life Class 2, Recreation Class E Existing Primary Contact Use, Agriculture, and Water Supply.

For stream segment COARFO02a, the chronic dissolved manganese and chronic dissolved iron standards set out in the regulations are specified as WS, which stands for water supply. The regulations intend for these standards to only be applicable in cases where there is a water supply in existing use on the stream segment. Fountain Creek is not currently an actively used water supply and therefore the standards for these parameters do not apply. However, the acute and chronic manganese standard based on Table Value Standards (TVS) does apply, as it is associated with the aquatic life use. For chronic total recoverable arsenic, the range of standards set out in the

regulations applies at the point of intake to a water supply. Because there are currently no downstream water supplies on this segment, the chronic total recoverable arsenic standard for water supplies is not applicable. Instead, the agricultural standard for total recoverable arsenic of 100 µg/l will apply, based on Regulation 31.

Table 2B **In-stream Standards for Stream Segment COARFO02a**
Physical and Biological
Dissolved Oxygen (DO) = 5 mg/l, minimum
pH = 6.5 - 9.0 su
E. coli chronic = 126 colonies/100 ml
Inorganic
Un-ionized Ammonia acute and chronic = old TVS, Type I Temp. Mod. (Exp. Date 12/31/2012)
Chlorine acute = 0.019 mg/l
Chlorine chronic = 0.011 mg/l
Free Cyanide acute = 0.005 mg/l
Sulfide chronic = 0.002 mg/l
Boron chronic = 0.75 mg/l
Nitrite acute = 1.0 mg/l
Nitrate acute = 10.0 mg/l
Chloride chronic = 250 mg/l
Sulfate chronic = 330 mg/l
Metals
Dissolved Arsenic acute = 340 µg/l
Total Recoverable Arsenic chronic = 100 µg/l
Dissolved Cadmium acute and chronic = TVS
Total Recoverable Trivalent Chromium acute = 50 µg/l
Dissolved Hexavalent Chromium acute and chronic = TVS
Dissolved Copper acute and chronic = TVS
Dissolve Cu acute and chronic = current condition Temp. Mod. (Exp. Date 12/31/2009)
Dissolved Iron chronic = WS (Does not apply)
Total Recoverable Iron chronic = 1000 µg/l
Dissolved Lead acute and chronic = TVS
Dissolved Manganese chronic = WS (Does not apply)
Dissolved Manganese acute and chronic = TVS
Total Mercury chronic = 0.01 µg/l
Dissolved Nickel acute and chronic = TVS
Dissolved Selenium acute = TVS
Dissolved Selenium chronic = 8 µg/l
Dissolved Silver acute and chronic = TVS
Dissolved Zinc acute and chronic = TVS

Standards for metals are generally shown in the regulations as Table Value Standards (TVS). These often must be derived from equations that depend on the receiving stream hardness or species of fish present; for ammonia, standards are discussed further in Section IV of this PEL determination analysis. The Classification and

Numeric Standards documents for each basin include a specification for appropriate hardness values to be used. Specifically, the regulations state that:

> *The hardness values used in calculating the appropriate metal standard should be based on the lower 95% confidence limit of the mean hardness value of the periodic low flow criteria as determined from a regression analysis of site-specific data. Where insufficient site-specific data exists to define the mean hardness value at the periodic low flow criteria, representative regional data shall be used to perform the regression analysis. Where a regression analysis is not appropriate, a site-specific method should be used.*

A regression analysis for Fountain Creek was conducted by the WQCD in conjunction with a previous PEL evaluation for the LFMSDD WRF (PEL-0200103 dated October 19, 2004). That analysis utilized data from USGS Sampling Station 07106000 (Fountain Creek near Fountain). This station is located approximately four miles downstream from the Fountain WRF and approximately 0.5 miles upstream of the point where discharge from the proposed LFMSDD WRF will enter Fountain Creek. Twenty-five paired flow and hardness data points were available for a period of record from December 1998 through December 2002. The regression analysis was computed to a low flow of 59 cfs, which was the lowest of the measured flows in the data set. The 95^{th} confidence interval was calculated to result in a hardness value equal to 311 mg/l. This hardness value and the formulas contained in the TVS were used to calculate the in-stream water quality standards for metals in Fountain Creek as shown in Table 3.

Table 3
TVS - Based Metals Water Quality Standards for Stream Segment COARFO02a
Based on the Table Value Standards contained in the Colorado Department of Public Health and Environment, Water Quality Control Commission *Regulation 32*

Calculated Using the Following Value for Hardness as $CaCO_3$: 311 mg/l

Parameter	***In-Stream Water Quality Standard***			***Formula Used***
Cadmium, Dissolved	Acute	7.4	µg/l	$[1.136672-0.041838\ln(\text{hardness})]e^{(0.9151(\ln(\text{hardness}))-3.1485)}$
	Chronic	1.0	µg/l	$[1.101672-0.041838\ln(\text{hardness})]e^{(0.7998(\ln(\text{hardness}))-4.4451)}$
Hexavalent Chromium, Dissolved	Acute	16	µg/l	Numeric standards provided, formula not applicable
	Chronic	11	µg/l	Numeric standards provided, formula not applicable
Copper, Dissolved	Acute	39	µg/l	$e^{(0.9422(\ln(\text{hardness}))-1.7408)}$
	Chronic	24	µg/l	$e^{(0.8545(\ln(\text{hardness}))-1.7428)}$
Lead, Dissolved	Acute	217	µg/l	$[1.46203-0.145712\ln(\text{hardness})]e^{(1.273(\ln(\text{hardness}))-1.46)}$
	Chronic	8.4	µg/l	$[1.46203-0.145712\ln(\text{hardness})]e^{(1.273(\ln(\text{hardness}))-4.705)}$
Manganese, Dissolved	Acute	4357	µg/l	$e^{(0.3331(\ln(\text{hardness}))+6.4676)}$
	Chronic	2407	µg/l	$e^{(0.3331(\ln(\text{hardness}))+5.8743)}$
Nickel, Dissolved	Acute	1223	µg/l	$e^{(0.846(\ln(\text{hardness}))+2.253)}$
	Chronic	136	µg/l	$e^{(0.846(\ln(\text{hardness}))+0.0554)}$
Selenium, Dissolved	Acute	18.4	µg/l	Numeric standards provided, formula not applicable
	Chronic	8.0	µg/l	Numeric standards provided, formula not applicable
Silver, Dissolved	Acute	14.3	µg/l	$½\ e^{(1.72(\ln(\text{hardness}))+6.52)}$
	Chronic	2.3	µg/l	$e^{(1.72(\ln(\text{hardness}))+9.06)}$
Zinc, Dissolved	Acute	377	µg/l	$0.978\ e^{(0.8525(\ln(\text{hardness}))+1.0617)}$
	Chronic	327	µg/l	$0.986\ e^{(0.8525(\ln(\text{hardness}))+0.9109)}$

B. Ambient Water Quality, Unnamed Tributary

Ambient water quality is evaluated based on a variety of statistical methods as prescribed in Section 31.8(2)(a)(i) and 31.8(2)(b)(i)(B) of the *Colorado Department of Public Health and Environment, Water Quality Control Commission Regulation No. 31.* Ambient water quality is evaluated in this PEL analysis for use in determining assimilative capacities and in completing antidegradation reviews for pollutants of concern, where applicable.

The ambient water quality was not assessed for the unnamed tributary into which the LFMSDD WRF will discharge because the background in-stream low flow condition is zero, and because no ambient water quality data are available, or applicable, for the unnamed tributary.

C. Ambient Water Quality, Fountain Creek

An assessment of the ambient water quality in Fountain Creek upstream of the modeled dischargers was conducted by the WQCD in conjunction with a PEL evaluation for the US Army - Fort Carson WRF (PEL - 200271 dated August 19, 2008). That assessment utilized data gathered from USGS Station 07105500 (Fountain Creek at Colorado Springs) located approximately 1 mile upstream of the Colorado Springs WRF, the uppermost facility. The findings of that assessment are judged to be

representative of current conditions and provide the best information available. Within that assessment for pH, temperature, ammonia, nitrate plus nitrite, total recoverable arsenic, dissolved copper, dissolved manganese, dissolved zinc, boron and sulfate, the data from a period of record from April 2003 through April 2008 were used. For other parameters, a period of record as early as October 2000 was used, due to inadequate recent data. For chloride, dissolved hexavalent chromium and dissolved nickel, data as early as October 1995 were used in the absence of more recent data. The data from this assessment is used to reflect upstream water quality. These data are summarized in Table 4.

Table 4
Ambient Water Quality for Fountain Creek

Parameter	***Number of Samples***	***15th Percentile***	***50th Percentile***	***85th Percentile***	***Mean***	***Chronic Stream Standard***	***Notes***
Temp (°C)	75	3	14	23	13	30	
DO (mg/l)	33	6.5	8.1	9.8	8.2	5.0	
pH (su)	33	7.9	8.2	8.3	8.1	6.5-9.0	
E. coli (#/100 ml)	13	11	220	840	15	126	1
NH_3 Tot (mg/l)	31	0	0.011	0.20	0.079	NA	2
As, TR (µg/l)	30	1.0	2.1	13	13	100	2
Cd, Dis (µg/l)	14	0	0	0	0.014	1.0	2
Cr+3, TR (µg/l)	16	1.0	2.0	15	7.2	NA	3
Cr+6, Dis (µg/l)	17	0	0	0	0	11	2
Cu, Dis (µg/l)	31	1.2	1.9	2.7	2.0	24	2
CN, Free (µg/l)	16	0	0	0	0	NA	2
Fe, Dis (µg/l)	17	0	0	32	12	NA	2
Fe, TR (µg/l)	15	933	2740	36049	16374	1000	
Pb, Dis (µg/l)	14	0	0	0	0.0064	8.4	2
Mn, Dis (µg/l)	31	6.0	20	43	23	2407	
Hg, Tot (µg/l)	20	0	0	0.073	0.036	0.010	2,4
Ni, Dis (µg/l)	28	0	0	1.0	0.53	136	2
Se, Dis (µg/l)	31	1.9	3.0	5.6	3.5	8.0	
Ag, Dis (µg/l)	17	0	0	0	0	2.3	2
Zn, Dis (µg/l)	31	2.6	6.3	15	8.0	327	
B, Tot (mg/l)	31	34	67	93	67	0.75	
Chloride, Tot (mg/l)	16	18	25	30	24	250	
Sulfate, Tot (mg/l)	32	50	95	160	105	330	
As, Dis (µg/l)	17	1.1	1.6	2.0	1.5	NA	2

Note 1: The calculated mean is the geometric mean. For summarization purposes, the value of one was used where there was no detectable amount because the geometric mean cannot be calculated using a value equal to zero.

Note 2: When sample results were below detection levels, the value of zero was used in accordance with the Division's standard approach for summarization and averaging purposes.

Note 3: No current data were available for total recoverable trivalent chromium (Cr+3). However, data reflecting the total Cr form (representing a combination of the trivalent and hexavalent forms) were available and thus were used as a background concentration.

Note 4: No current or historical ambient background data were available for total mercury. However, dissolved mercury data were available and thus were used as the background concentration.

III. Water Quantity

The Colorado Regulations specify the use of low flow conditions when establishing water quality based effluent limitations, specifically the acute and chronic low flows. The acute low flow, referred to as 1E3, represents the one-day low flow recurring in a three-year interval. The chronic low flow, 30E3, represents the 30-day average low flow recurring in a three-year interval.

A. Low Flow Analysis for Unnamed Tributary

Although there is periodic flow in the unnamed tributary upstream of the proposed discharge from the LFMSDD WRF, the 1E3 and 30E3 monthly low flows are assumed to be zero since historic flow data is not available. For this analysis, low flows are summarized in Table 5A.

Table 5A
Low Flows for Unnamed Tributary at the LFMSDD WRF

Low Flow (cfs)	***Annual***	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***
1E3 Acute	0	0	0	0	0	0	0	0	0	0	0	0	0
30E3 Chronic	0	0	0	0	0	0	0	0	0	0	0	0	0

B. 7E3 Low Flow Analysis

For purposes of evaluating the assimilative capacity for temperature, the same data discussed above was used in calculating the 7E3 low flow. The 7E3 low is also 0 cfs. The term, 7E3, represents the average low flow rate over a 7-day period in a 3-year interval.

C. Mixing Zone Considerations

Since the chronic low flow in the unnamed tributary into which the proposed LFMSDD WRF will discharge is zero, the mixing ratio (volume of discharge to volume of flow in receiving stream) is greater than 2:1. The proposed facility is therefore exempt from further mixing zone considerations in accordance with the Colorado Mixing Zone Implementation Guidance.

D. Low Flow Analysis for Fountain Creek

As previously discussed, there are currently five WRFs that discharge to Fountain Creek within a 12.5 mile reach of Segment 02a. In view of this, it has become the WQCD's practice to employ a multi-user modeling methodology relative to the dischargers in this section of Fountain Creek. The WQCD's previous basin-wide low flow analyses of Fountain Creek, from a point above the Colorado Springs WRF

discharge to a point below the Fountain Sanitation District WRF discharge, indicated that during times of low flow there are no confluences or additions of significance between the five facilities. Thus, although Fountain Creek is a gaining stream in this area, the WQCD concluded that the increases in stream flow between these facilities during times of low flow are mostly attributable to the effluent discharges from the WRFs in this stretch. The low flows determined upstream of the Colorado Springs WRF discharge are therefore considered the acute and chronic dilution low flows for the multi-user modeling methodology utilized by the WQCD in this stretch of Fountain Creek.

The low flows for the multi-user modeling analyses conducted as part of this PEL evaluation are based on a basin-wide low flow analysis conducted by the WQCD in conjunction with a PEL evaluation for the US Army – Fort Carson WRF (PEL-200271 dated August 19, 2008). To determine the acute and chronic dilution low flow values, the WQCD utilized daily flow data from USGS Gage Station 07105500 (Fountain Creek at Colorado Springs, CO). This gage station is located approximately one mile upstream of the Colorado Springs WRF discharge. The acute and chronic dilution low flows were calculated by the WQCD utilizing flow data from this station for a period of record from October 1, 1997 through September 30, 2007. The daily flow data from this gage station were input to US Environmental Protection Agency (EPA) DFLOW software. The output from DFLOW provides calculated acute and chronic low flows for each month. The gage station and time frame utilized in the WQCD's low flow analysis were deemed to be representative of current flow conditions. Table 5B contains a summary of calculated dilution low flows that are consistent with the WQCD's basin-wide flow analysis methodology.

Table 5B
Dilution Flows for Fountain Creek

Low Flow (cfs)	***Annual***	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***
1E3 Acute	5.9	6.8	11	12	12	8.5	6.8	6.0	6.1	5.9	12	9.6	11
30E3 Chronic	11	15	12	17	14	12	12	11	11	11	13	16	15

To determine the acute and chronic low flows available to the LFMSDD WRF for the antidegradation analysis, data from USGS Gage Station 07106000 (Fountain Creek near Fountain, CO) were utilized. This gage station is located on Fountain Creek at a point approximately 0.5 miles upstream of the confluence with the unnamed tributary into which the proposed LFMSSD WRF will discharge. This flow gage provides a representative measurement of upstream flow because it is located immediately upstream of the proposed LFMSDD WRF location and there are no significant diversions or additions in between.

The low flows available to the LFMSDD WRF for the antidegradation analysis conducted as part of this PEL evaluation are based on a low flow analysis conducted by the WQCD in conjunction with a previous PEL evaluation for the LFMSDD WRF

(PEL-0200103 dated October 19, 2004). Daily flow data from USGS Gage Station 07106000 for a period of record from October 1, 1993, through September 30, 2003 were used by the WQCD to calculate acute and chronic low flows available in Fountain Creek upstream of the unnamed tributary. The daily flow data from this gage station were input to US Environmental Protection Agency (EPA) DFLOW software. The output from DFLOW provides calculated acute and chronic low flows for each month. The gage station and time frame utilized in the WQCD's low flow analysis were deemed to be representative of current flow conditions.

The upstream low flows available to the LFMSDD WRF based on this low flow analysis are presented in Table 5C. During the months of March and November, the acute low flow calculated by DFLOW exceeded the chronic low flow. In accordance with WQCD standard procedures, the acute low flow was set equal to the chronic low flow for these months.

Table 5C
Low Flows for Fountain Creek at the LFMSDD WRF

Low Flow (cfs)	***Annual***	***Jan***	***Feb***	***Mar***	***Apr***	***May***	***Jun***	***Jul***	***Aug***	***Sep***	***Oct***	***Nov***	***Dec***
1E3 Acute	32	71	89	69	33	49	55	32	33	42	36	61	68
30E3 Chronic	58	82	89	69	58	58	58	58	58	58	58	61	80

IV. Technical Analysis

In-stream background data and low flows evaluated in Sections II and III are ultimately used to determine the assimilative capacity of the unnamed tributary into which the proposed LFMSSD WRF will discharge as well as Fountain Creek near the LFMSDD WRF for pollutants of concern. For all parameters except ammonia, it is the WQCD's standard procedure to conduct a technical analysis of stream assimilative capacity using the lowest of the monthly low flows (referred to as the annual low flow) as calculated in the low flow analysis. For ammonia, it is the standard procedure of the WQCD to determine assimilative capacities for each month using the monthly low flows calculated in the low flow analysis, as the regulations allow the use of seasonal (i.e. monthly) flows when establishing assimilative capacities.

The WQCD's standard analysis procedure consists of steady-state, mass-balance calculations for most pollutants and modeling for pollutants such as ammonia. The mass-balance equation is used to calculate the maximum allowable concentration of pollutants in the effluent, and accounts for the upstream concentration of a pollutant at the existing quality, critical low flow (minimal dilution), effluent flow and the water quality standard. The mass-balance equation is expressed as:

$$M_2 = \frac{M_3 Q_3 - M_1 Q_1}{Q_2}$$

Where,

Q_1 = Upstream low flow (1E3 or 30E3)
Q_2 = Average daily effluent flow (design capacity)
Q_3 = Downstream flow (Q_1 + Q_2)
M_1 = In-stream background pollutant concentrations at the existing quality
M_2 = Calculated maximum allowable effluent pollutant concentration
M_3 = Maximum allowable in-stream pollutant concentration (water quality standards)

When Q_1 equals zero, as occurs in the unnamed tributary, Q_2 equals Q_3 and therefore M_2 equals M_3. Because the low flow (Q_1) for the unnamed tributary is zero, the assimilative capacity of the unnamed tributary for the pollutants of concern is equal to the in-stream water quality standards.

For discharges reaching Fountain Creek, the upstream background pollutant concentrations used in the mass-balance equation will vary based on the regulatory definition of existing ambient water quality. For most pollutants, existing quality is determined to be the 85th percentile. For metals in the total recoverable form, existing quality is determined to be the 50th percentile. For pathogens such as fecal coliform and E. coli, existing quality is determined to be the geometric mean.

For non-conservative parameters such as ammonia, the mass-balance equation is not as applicable and thus other approaches are considered where appropriate. Conservative pollutants are pollutants that are modeled as if mass is conserved and there is no degradation, whereas non-conservative pollutants degrade and sometimes are created within a receiving stream depending on stream conditions. A more detailed discussion of the technical analysis for these parameters is provided in the pages that follow.

A. Pollutants Evaluated

The following pollutants were identified as pollutants of concern for this facility:

- BOD_5 (5-day Biochemical Oxygen Demand)
- TSS (Total Suspended Solids)
- Percent removal
- Oil and Grease
- pH
- DO (Dissolved Oxygen)
- E. coli
- Total Residual Chlorine
- Ammonia
- Metals and cyanide.

There are no in-stream water quality standards for BOD_5, TSS, percent removal, and oil and grease for the unnamed tributary into which the proposed LFMSSD WRF will discharge or Fountain Creek. Thus, assimilative capacities were not determined for these parameters in this section and an antidegradation review for these parameters was not conducted in Section V. The evaluation of applicable limitations for these pollutants can be found in Section VI, Regulatory Analysis.

It is the WQCD's standard procedure to consider metals and cyanide as potential pollutants of concern for all major domestic WRFs and all industrial facilities. Cyanide and metals are being evaluated as part of this PEL evaluation in order to help ensure that the facility is aware of potential metals and cyanide pollutant limits. This facility will later be subject to a CDPS permit that may contain cyanide and metals limits, subject to a reasonable potential analysis undertaken when the CDPS permit is prepared. However, it is the WQCD's preferred approach to ensure control of cyanide and metals through a pretreatment program, if necessary, rather than through wastewater treatment at the applicant's facility. It is recognized that source control of pollutants may not be sufficient to satisfy certain effluent limits determined in accordance with the WQCD antidegradation review criteria. Advanced treatment technology or modification of the antidegradation review based effluent limits may be necessary.

According to the *Rationale for Classifications, Standards and Designations of the Arkansas River*, stream segment COARFO02a is designated as a water supply. There are currently no public surface water supply uses on Fountain Creek downstream of the proposed LFMSDD WRF. For this reason, the nitrite and nitrate standards, which are applied at the point of intake to a water supply, are not evaluated as part of this PEL evaluation.

During assessment of the facility, nearby facilities, and receiving stream water quality, no additional parameters were currently identified as pollutants of concern.

B. Sources of Pollutants

1. LFMSDD WRF

The LFMSDD WRF is proposed to be located in the SW ¼ of the SW ¼ of Section 27, SE ¼ of the SE ¼ of Section 28, NE ¼ of the NE ¼ of Section 33 and NW ¼ of the NW ¼ of Section 34, all in T16S, Range 65 West, at 38°37'13" latitude North and 104°39'51" longitude West, in El Paso County. The proposed design capacity of the LFMSDD WRF is 2.5 MGD (3.87 cfs). Wastewater treatment is proposed to be accomplished using a mechanical wastewater treatment process. The technical analyses that follow include assessments of the assimilative capacity based on this design capacity.

2. Colorado Springs, Cherokee, Security, Fort Carson, Widefield and Fountain WWTFs

The Colorado Springs, Cherokee, Security, Fort Carson, Widefield, and Fountain WWTFs all ultimately discharge into Fountain Creek (Stream Segment COARFO02a). The current design capacities of these facilities are:

Colorado Springs = 75 MGD (116.04 cfs)
Cherokee = 2.0 MGD (3.09 cfs)
Security = 2.4 MGD (3.71 cfs)
Fort Carson = 4.0 MGD (6.19 cfs)
Widefield = 2.5 MGD (3.87 cfs)
Fountain = 1.908 MGD (2.95 cfs)

Wastewater treatment is accomplished using a mechanical treatment process at all of these facilities except the Cherokee WWTF, which utilizes an aerated lagoon treatment process. The Cherokee WWTF is expected to be decommissioned by April 30, 2010, and a new facility will be constructed that discharges to another basin. Therefore, the contributions from this facility have not been included in this evaluation.

The technical analyses that follow include assessments of the assimilative capacities based on these design capacities.

3. Nearby Sources

An assessment of nearby facilities conducted by the WQCD in conjunction with a PEL evaluation for the US Army - Fort Carson WWTF (PEL-200271 dated August 19, 2008) utilizing the EPA's Permit Compliance System (PCS) database found 113 discharges in the El Paso County area. More than one-half of these facilities conducted construction related operations (e.g., sand and gravel mining, construction dewatering, construction site runoff, etc.) and thus had no pollutants of concern in common with the modeled facilities. Several facilities were discharging to another watershed. Other facilities were located more than twenty miles from the Colorado Springs, Security, Fort Carson, Widefield, Fountain and proposed LFMSDD WRFs and thus were not considered. The nearest discharger was:

- Colorado Springs-Martin Drake Power Plant (CO-0000850), which discharges to Fountain Creek approximately 2.3 miles upstream of where the Colorado Springs WWTF discharge enters Fountain Creek. Although this facility has permit limits for several metals and total residual chlorine, it discharges only in emergency situations such as an extended power failure that would prevent internal recycling of wastewater for a long period of time which would then cause the retention pond to overtop and discharge to Fountain Creek. In the past, this has rarely occurred. On this basis, the WQCD concluded that this facility is not expected to impact the assimilative capacities of Fountain Creek in the vicinity of the six subject facilities.

There are no known existing point source discharges to the unnamed tributary into which the proposed LFMSSD WRF will discharge. Also, the in-stream low flow of the unnamed tributary is zero. Thus, the assimilative capacities during times of low flow were assumed not to be affected by other nearby contributions into the unnamed tributary (if there are any). Therefore, modeling of the unnamed tributary in conjunction with the LFMSDD WRF was not necessary when determining assimilative capacities in the unnamed tributary.

However, as stated previously, the Colorado Springs (75 MGD), Security (2.4 MGD), Fort Carson (4.0 MGD), Widefield (2.5 MGD), and Fountain (1.908 MGD) WWTFs will be modeled together with the LFMSDD WRF for ammonia, and metals and cyanide when determining assimilative capacities in Fountain Creek. The combined current design capacity of the six facilities discharging to Fountain Creek is 88.31 MGD (136.63 cfs). The ambient water quality background

concentrations used in the mass-balance equation account for pollutants of concern contributed by upstream sources. Therefore, it was not necessary to model any additional upstream dischargers when determining the available assimilative capacities in Fountain Creek. Due to the distance traveled and the change in characteristics of the receiving stream, modeling additional downstream facilities was not deemed to be necessary.

Based on available information, there is an indication that non-point sources for sediment, total recoverable iron, E. coli, and selenium are significant sources in some reaches of Fountain Creek. However, for purposes of modeling this stretch of Fountain Creek, the non-point sources were considered only in the upstream ambient conditions. For other pollutants, no information suggests that non-point sources are a significant source of pollutants of concern. Thus, non-point sources for other pollutants were not considered in this assessment.

C. Pollutant Analyses

1. pH

The pH of steam water measures the intensity or concentration of the acidity or alkalinity of the stream. When pH falls outside of the neutral range, it can be harmful to aquatic life. To determine assimilative capacities of a stream for pH, the buffering capacity of the receiving stream and its interaction with the discharge contributions would need to be assessed in a complex evaluation.

An evaluation of pH data available for Fountain Creek near the proposed LFMSDD WRF found that the 15^{th} percentile value was well above the minimum in-stream water quality standard and the 85^{th} percentile value was well below the maximum in-stream water quality standard. Because only limited data are available and because ambient water quality data indicate that no further controls are needed to meet in-stream pH standards, a complex evaluation of the assimilative capacity for pH is not warranted for this facility.

The full assimilative capacity of the unnamed tributary, into which the proposed LFMSDD WRF will discharge, for pH was determined to equal the in-stream water quality standard of 6.5 to 9.0 su. It was not necessary to evaluate downstream standards for pH because the more stringent upstream standards apply.

2. DO

The availability of dissolved oxygen in receiving streams is critical for aquatic life. Decomposition of organic matter and nitrification within receiving streams are generally the causes of the depletion of DO from receiving waters.

For a non-conservative parameter like DO, a simple mass balance cannot be used to determine assimilative capacity. Instead, background DO, stream flow, 5-day biochemical oxygen demand and ammonia loading, stream dimensions, temperature, and estimates of effluent DO may be incorporated into models such as the Streeter-Phelps DO model or STREAMDO to simulate the impact of WRF discharges.

An evaluation of DO data available for Fountain Creek near the proposed LFMSDD WRF found that the 15th percentile value was well above the minimum in-stream water quality standard. Because only limited data are available and because ambient water quality data indicate that no further controls are needed to meet in-stream standards for DO, modeling was not conducted as part of this evaluation and no further discussion of DO is provided.

3. Chlorine

There are no in-stream standards for chlorine in stream segment COARFO04, while stream segment COARFO02a does have both chronic and acute standards for chlorine. However, any discharge of chlorine from the proposed LFMSDD WRF should dissipate or be consumed by oxidizable material along the stream channel by the time it reaches Fountain Creek, 1.5 miles downstream. Chlorine rapidly oxidizes biodegradable materials and in-stream levels of residual chlorine are normally detected only for a short distance below a source. Furthermore, the proposed LFMSSD WRF will utilize an ultraviolet (UV) radiation disinfection system and would not be expected to produce chlorine as a pollutant of concern.

It should be noted, the *Regulations for Effluent Limitations, Regulation 62* specifies a total residual chlorine instantaneous maximum limit of 0.5 mg/l, as discussed later in this PEL analysis.

4. E. coli

Available studies indicate that *Escherichia coli (E. coli)*, which is a subset of fecal coliform, is a good predictor of potential human health impacts from waterborne pathogens. For all segments in the Arkansas River Basin, standards are adopted for only E. coli for use in establishing effluent limits. Fountain Creek is currently exceeding the E. coli standard, so there is no assimilative capacity for E. coli at this time.

There are no point sources discharging E. coli within one mile of the proposed LFMSSD WRF discharge. Because the chronic low flow in the unnamed tributary into which the proposed LFMSSD WRF will discharge is zero, the full assimilative capacity of the stream segment COARFO04 for E. coli was determined to equal the in-stream water quality standard of 126 colonies/100 ml (chronic). It was not necessary to evaluate the downstream standard for E. coli because the current in-stream background pollutant concentration exceeds the in-stream water quality standard. In such cases, the WQCD standard procedure is to set the effluent limit equal to the stream standard until the Restoration & Protection Unit has completed its evaluation of the receiving stream and determined Total Maximum Daily Loads (TMDLs) and Waste Load Allocations (WLAs), where appropriate. Thus, the more stringent upstream effluent limit applies first.

5. Metals and Cyanide

Metals and cyanide may be present at large domestic WRFs that accept discharges from industrial contributors. It is the standard approach of the WQCD

to determine the available assimilative capacities for cyanide and those metals for which ambient water quality standards are available.

a. Unnamed Tributary

Because the chronic and acute low flows in the unnamed tributary into which the proposed LFMSDD WRF will discharge is zero, the assimilative capacity of the stream for metals and cyanide was determined to equal the in-stream water quality standards, as shown in Table 6. It should be noted that there are no acute in-stream water quality standards for metals on this stream segment.

Table 6
Chronic Assimilative Capacities for Metals and Cyanide in Unnamed Tributary

Parameter	***Q_1 (cfs)***	***Q_2 (cfs)***	***Q_3 (cfs)***	***M_1***	***M_3***	***M_2***	***Notes***
As, Trec (ug/l)	0	3.87	3.87	0	100	100	
Be, Trec (ug/l)	0	3.87	3.87	0	100	100	
Cd, Trec (ug/l)	0	3.87	3.87	0	10	10	
Cr^{+3}, Trec (ug/l)	0	3.87	3.87	0	100	100	
Cr^{+6}, Trec (ug/l)	0	3.87	3.87	0	100	100	
Cu, Trec (ug/l)	0	3.87	3.87	0	200	200	
Pb, Trec (ug//l)	0	3.87	3.87	0	100	100	
Ni, Trec (ug/l)	0	3.87	3.87	0	200	200	
Se, Trec (ug/l)	0	3.87	3.87	0	20	20	
Zn, Trec (ug/l)	0	3.87	3.87	0	2,000	2,000	
CN, Free (ug/l) **(acute)**	0	3.87	3.87	0	200	200	

b. Fountain Creek

For the reasons previously discussed, the Colorado Springs, Security, Fort Carson, Widefield and Fountain WWTFs are modeled together with the proposed LFMSDD WRF relative to metals and cyanide. According to the WQCD's basin-wide analyses of the flow increases between these facilities during times of low flow, the increases in stream flow between these facilities is primarily attributable to facility effluent discharges. There is therefore no additional flow during times of low flow that provides additional dilution. For this reason, assimilative capacities for metals and cyanide will be determined for all six subject facilities together. Because the six facilities are being modeled together, the dilution low flows from Table 5B are the applicable low flows, Q_1, used in the calculations. The effluent flow, Q_2, reflects the combined flow of 136.6 cfs (88.31 MGD) representing the design flows of all six facilities (Cherokee WWTF excluded and the proposed LFMSDD WRF included).

Using the mass-balance equation provided in the beginning of Section IV, the low flows upstream of the Colorado Springs WWTF provided in Table 5B of Section III, the background concentrations contained in Table 4 of Section II and the in-stream standards for metals and cyanide shown in Table 2B and

Table 3 of Section II, assimilative capacities for metals and cyanide were calculated. Since the design flow, Q_2, reflects the combined design flow of all six modeled facilities, the resulting calculation of allowable discharge concentration, M_2, is applicable to all six facilities. The data used and the resulting calculations of the allowable discharge concentrations (WQBELs), M_2, are presented in Table 7 for chronic assimilative capacities and in Table 8 for acute assimilative capacities. The terminology WQBEL represent, "water quality based effluent limits."

Table 7
Chronic Assimilative Capacities for Metals in Fountain Creek

Parameter	*Q_1 (cfs)*	*Q_2 (cfs)*	*Q_3 (cfs)*	*M_1*	*M_3*	*M_2*	*Notes*
As, Trec (ug/l)	11	136.6	147.6	2.1	100	108	
Cd, Dis (ug/l)	11	136.6	147.6	0	1	1.1	
Cr^{+6}, Dis (ug/l)	11	136.6	147.6	0	11	11.9	
Cu, Dis (ug/l)	11	136.6	147.6	2.7	24	25.7	
Fe, Trec (ug/l)	11	136.6	147.6	2,740	1,000	1,000	1
Pb, Dis (ug/l)	11	136.6	147.6	0	8.4	9.1	
Mn, Dis (ug//l)	11	136.6	147.6	43	2,407	2,597	
Hg, Tot (ug/l)	11	136.6	147.6	0	0.010	0.011	
Ni, Dis (ug/l)	11	136.6	147.6	1	136	147	
Se, Dis (ug/l)	11	136.6	147.6	5.6	8.0	8.2	
Ag, Dis (ug/l)	11	136.6	147.6	0	2.3	2.5	
Zn, Dis (ug/l)	11	136.6	147.6	15	327	352	

Note 1: Ambient in-stream background concentration is higher that water quality standard, so effluent concentration, M2, is set to water quality standard

Table 8
Acute Assimilative Capacities for Metals and Cyanide in Fountain Creek

Parameter	*Q_1 (cfs)*	*Q_2 (cfs)*	*Q_3 (cfs)*	*M_1*	*M_3*	*M_2*	*Notes*
As, Dis (ug/l	5.9	136.6	142.5	13	340	354	
Cd, Dis (ug/l)	5.9	136.6	142.5	0	7.4	7.7	
Cr^{+3},Trec (ug/l)	5.9	136.6	142.5	2	50	52	
Cr^{+6},Dis (ug/l)	5.9	136.6	142.5	0	16	17	
Cu, Dis (ug/l)	5.9	136.6	142.5	2.7	39	41	
Pb, Dis (ug/l)	5.9	136.6	142.5	0	217	226	
Mn, Dis (ug/l)	5.9	136.6	142.5	43	4,357	4,543	
Ni, Dis (ug/l)	5.9	136.6	142.5	1	1,223	1,276	
Se, Dis (ug/l)	5.9	136.6	142.5	5.6	18.4	19	
Ag, Dis (ug/l)	5.9	136.6	142.5	0	14.3	15	
Zn, Dis (ug/l)	5.9	136.6	142.5	15	377	393	
CN, Free (ug/l)	5.9	136.6	142.5	0	5.0	5.2	

As noted in Table 7, the ambient upstream water quality concentration

exceeds the in-stream standard in Fountain Creek for total recoverable iron. According to WQCD standard procedure, the WQCD's Restoration & Protection Unit investigates issues of water quality standard exceedances. The Restoration & Protection Unit is tasked with determining if the exceedances are valid and placing the receiving stream on the Clean Water Act Section 303(d) list of impaired waters, if appropriate. If the receiving water is placed on the State's 303(d) list, the Restoration & Protection Unit is tasked with developing the Total Maximum Daily Loads (TMDLs) and the Waste Load Allocations (WLAs) to be distributed to the affected facilities. Where an assimilative capacity is calculated to be less than the in-stream standard, the WQCD's standard procedure is to set the effluent limit equal to the stream standard to prevent degradation of the receiving waters until the Restoration & Protection Unit has completed its evaluation of the receiving stream and determined TMDLs and WLAs, where appropriate.

It should also be noted that a temporary modification for the in-stream acute and chronic water quality standard for copper is currently in place for Fountain Creek Segment COARFO02a. This temporary modification is identified as a Type (iii) modification and is scheduled to expire December 31, 2009. A Type (iii) temporary modification is granted where there is significant uncertainty regarding the appropriate long-term underlying standard and recognizes current conditions while providing an opportunity to resolve the uncertainty.

This temporary modification was granted by the WQCC at the June 2007 Rulemaking Hearing for Regulation No. 32. The statement of basis and purpose for this hearing states, "*The temporary modification is set at "current condition." It is the intention of the Commission that when implementing this temporary modification in a CDPS permit, and interpreting the term current condition, the Division will assess the current effluent quality, recognizing that it changes over time due to variability in treatment plant removal efficiency and influent loading from industrial, commercial, and residential sources. One necessary element of an approach to maintain the current condition would be a requirement that the total loading from commercial and industrial contributors be maintained at that level as of the date of adoption of the temporary modification and that neither the concentration nor the frequency of high concentration shall increase over historic levels and frequency*".

For the purposes of this PEL evaluation, it has been assumed that this temporary modification will be removed and the underlying standard for copper will revert back to the TVS contained in the current Regulation No. 32. This is viewed as a "worse case scenario".

6. Ammonia

The Ammonia Toxicity (AMMTOX) Model is a software program designed to predict the downstream effects of ammonia and the ammonia assimilative capacities available to each discharger based on upstream water quality and effluent discharges. There are four dischargers to the mainstem of Fountain Creek (the Colorado Springs WWTF, Security WWTF, Widefield WWTF and Fountain WWTF) that need to be included in the AMMTOX analysis for the LFMSDD WRF.

In addition, contributions from dischargers to tributaries (i.e. Fort Carson WWTF) also need to be accounted for in this AMMTOX analysis.

Contributions from the Cherokee WWTF, which discharges to the East Fork of Sand Creek, were not included in this analysis because the Cherokee WWTF is expected to be decommissioned by April 30, 2010 with a new facility being constructed that will discharge to a different basin. Due to the proximity of these five existing WWTFs, they were modeled together with the proposed LFMSSD WRF to determine assimilative capacities for ammonia in Fountain Creek. The WQCD has developed a combined AMMTOX model for this reach of Fountain Creek. The WQCD's current combined model was utilized in this analysis.

In developing this analysis for the proposed LFMSDD WRF, one AMMTOX model was used to account for ammonia additions and degradation in Fountain Creek as well as changes in flows and stream characteristics from a point above the discharge from the Colorado Springs WWTF to several miles below the confluence with Fountain Creek of the unnamed tributary into which the proposed LFMSDD WRF will discharge. Because the proposed LFMSDD WRF will discharge to a tributary to Fountain Creek, a separate AMMTOX model was utilized to evaluate the change in ammonia (degradation) in the unnamed tributary. Significant change will occur as the LFMSDD WRF effluent travels approximately 1.5 miles down the unnamed tributary to the confluence with Fountain Creek.

This analysis for ammonia is based primarily on assimilative capacities available in Fountain Creek at the confluence with the unnamed tributary into which the proposed LFMSDD WRF will discharge and the underlying stream standards in stream segment COARFO02a. There are no underlying in-stream standards for ammonia in the stream segment into which the proposed LFMSDD WRF will discharge (COARFO04). Assimilative capacities for ammonia in this stream segment were therefore calculated based on the allowable in-stream ammonia concentrations at the point of confluence with Fountain Creek and the reduction in ammonia that will occur between this point of confluence and the point of discharge from the proposed LFMSDD WRF.

To develop data for the AMMTOX model, an in-stream water quality study should be conducted of the upstream receiving water conditions, particularly the pH and corresponding temperature, over a period of at least one year. Temperature and corresponding pH data sets reflecting upstream ambient receiving water conditions were available for Fountain Creek based on studies previously conducted by the Colorado Springs WWTF, Security WWTF, Widefield WWTF, and Fountain WWTF.

The Colorado Springs WWTF supplied upstream pH and temperature data from a study performed between October 1991 and September 1996, the Security WWTF data represented a period of record from March 1996 through February 2000, the Widefield WWTF data represented a period of record from September 1994 through December 1999 and Fountain WWTF data represented a period of record from August 1995 through July 1999. The WQCD utilized all of this data to establish the respective setpoint conditions for their combined AMMTOX model. The upstream pH and temperature data supplied by the Colorado Springs WWTF

were utilized by the WQCD to establish the headwater conditions for the combined AMMTOX model. There is no ammonia study data available for Fountain Creek immediately upstream of the confluence with the unnamed tributary into which the proposed LFMSDD WRF will discharge. Therefore, set point conditions established from the Fountain WWTF ammonia study data were utilized for all reaches downstream of the Fountain WWTF discharge.

Effluent pH and temperature data were also available from the Colorado Springs WWTF, Security WWTF, Widefield WWTF, and Fountain WWTF studies and were used by the WQCD to establish the average facility contributions in the combined AMMTOX model. During the period of record for the Fountain WWTF study (August 1995 through July 1999) the treatment process utilized at the Fountain WWTF was changed from an aerated lagoon treatment system to an activated sludge treatment system. A review of the Fountain WWTF study data reflects this change occurring during the fourth quarter of 1998. Facility effluent temperature and pH values changed significantly following the change in treatment process. It was therefore judged that the data from the referenced ammonia study was not a valid basis upon which to conduct this analysis for total ammonia.

Effluent temperature and pH data for the Fountain WWTF were obtained for a period from January 2003 through December 2007. This data was utilized, in lieu of the previous ammonia study data, to establish the average facility contributions in the combined AMMTOX model. There were no effluent pH or temperature data available for the LFMSDD WRF as the facility does not yet exist. For the LFMSDD WRF, the effluent pH and temperature data from the Fountain WWTF were deemed the most representative and therefore were used in the model.

Upstream ammonia data for each month were not available. Thus, the mean total ammonia concentration found in Table 4 (0.079 mg/l) was used as an applicable ammonia concentration upstream of the uppermost discharger (Colorado Springs WWTF) for all months. Because there are no dischargers or other known contributors of ammonia to the unnamed tributary into which the proposed LFMSDD WRF will discharge and the low flow in the unnamed tributary is assumed to be zero, upstream data in the unnamed tributary are not required.

The AMMTOX model may be calibrated for a number of variables in addition to the data discussed above. The values used for the other variables in the model are listed below:

- Stream velocity = $0.3\ Q^{0.4d}$
- Default ammonia loss rate = 6/day
- pH amplitude was assumed to be medium
- Default times for pH maximum, temperature maximum and time of day of occurrence
- pH rebound was set at the default value of 0.2 su per mile
- Temperature rebound was set at the default value of 0.7 degrees C per mile

The results of the ammonia analyses for the LFMSDD WRF are presented in Table 9 and Table 10.

Table 9 Ammonia Assimilative Capacity in Fountain Creek At Confluence of Unnamed Tributary and Fountain Creek (Based on protecting the ammonia standard in Fountain Creek)		
Month	**Total Ammonia, chronic (mg/l)**	**Total Ammonia, acute (mg/l)**
January	**41**	**41**
February	**41**	**>45***
March	**38**	**>45***
April	**16**	**29**
May	**19**	**32**
June	**22**	**>45***
July	**25**	**>45***
August	**24**	**>45***
September	**20**	**>45***
October	**15**	**>45***
November	**20**	**43**
December	**36**	**44**

* - Treated domestic effluent should be less than 45 mg/l.

Table 10 Water Quality Based Effluent Limitations For the LFMSDD WRF (Based on protecting the ammonia standard in Fountain Creek and ammonia reduction in the Unnamed Tributary)		
Month	**Total Ammonia, chronic (mg/l)**	**Total Ammonia, acute (mg/l)**
January	**>45***	**>45***
February	**>45***	**>45***
March	**>45***	**>45***
April	**31**	**>45***
May	**43**	**>45***
June	**>45***	**>45***
July	**>45***	**>45***
August	**>45***	**>45***
September	**>45***	**>45***
October	**36**	**>45***
November	**39**	**>45***
December	**>45***	**>45***

* - Treated domestic effluent should be less than 45 mg/l.

Based on this analysis, the assimilative capacity of the unnamed tributary into which the proposed LFMSDD WRF will discharge is large enough to allocate a total ammonia effluent concentration of greater than 45 mg/l for most months. Because treated domestic wastewater effluent is not expected to have a total ammonia concentration greater than 45 mg/l, no additional allocations are provided as per WQCD standard procedure.

V. Antidegradation Review

A. Antidegradation Regulation

As set out in *The Basic Standards and Methodologies for Surface Water,* Section 31.8(2)(b), an antidegradation analysis is required except in cases where the receiving water is designated as, "Use Protected." Note that, "Use Protected," waters are waters, "*that the Commission has determined do not warrant the special protection provided by the outstanding waters designation or the antidegradation review process*." The antidegradation section of the regulation became effective in December 2000 and therefore antidegradation considerations are applicable to this PELs evaluation.

According to the recent decisions made by the WQCC for the *Classifications and Numeric Standards for Arkansas River Basin,* stream segment COARFO04 is to be re-designated Use Protected and stream segment COARFO02a is to remain Undesignated. Thus, an antidegradation review is required for segment COARFO02a if new or increased impacts are found to occur.

The WQCD's *Antidegradation Significance Determination for New or Increased Water Quality Impacts Procedural Guidance* provides guidance on the determination of new or increased water quality impacts and significant degradation. Consistent with current WQCD procedures, the baseline water quality (BWQ) concentrations for pollutants of concern should be established so they can be used as part of antidegradation reviews. BWQ is defined by the WQCD as the condition of the water quality as of September 30, 2000. The WQCD also specifies that BWQ concentrations are to include the influence of the dischargers if in place on September 30, 2000.

B. BWQ Concentrations for Fountain Creek Based on Downstream Data

BWQ concentrations for Fountain Creek were established by the WQCD in conjunction with a PEL evaluation for the US Army - Fort Carson WRF (PEL - 200271 dated August 19, 2008) utilizing water quality data from USGS Gage Station 07106000 (Fountain Creek at Fountain). This gage station lies approximately 0.5 miles upstream of where the unnamed tributary, into which the LFMSDD WRF will discharge, enters Fountain Creek. Since the five upstream dischargers were in place and the LFMSDD WRF was not in place on September 30, 2000, the data from this gage station is representative of downstream water quality as of September 30, 2000. This data accounts for historic contributions from all of the upstream WRF discharges.

Currently, it is the WQCD's standard procedure to evaluate five years of ambient water quality data, if available, for the five years prior to September 30, 2000 when determining the ambient water quality during the antidegradation period. In order to have enough data for statistical significance, a period of record from 1998 to 2003 was utilized by the WQCD in the August 19, 2008 analysis.. Table 11 presents the WQCD's analysis of this data.

Table 11 Ambient Water Quality for Fountain Creek for the Antidegradation Review	
Parameter	**BWQ**
Ag, Dis (ug/l)	0
As, Dis (ug/l)	0
Cd, Dis (ug/l)	0.129
Cr^{+3}, Dis (ug/l)	0
Cr^{+6}, Dis (ug/l)	0
Cu, Dis (ug/l)	4.3
Fe, Trec (ug/l)	1,810
Hg, Tot (ug/l)	0
Mn, Dis (ug/l)	16
Ni, Dis (ug/l)	8.6
Pb, Dis (ug/l)	0.38
Se, Dis (ug/l)	8.9
Zn, Dis (ug/l)	27
E. coli, (#/100 ml)	37

Ammonia data were not available for some months and insufficient ammonia data were available for some months to provide statistical significance. Therefore, the 85th percentile of all the available data (0.201 mg/l) was utilized as the BWQ for total ammonia.

The source and significance of the zero values in Table 11 are generally unknown but present an area of concern. Based on an understanding of the source of the data, WQCD and/or USGS sampling, it is very likely the method detection limits for some parameters used in the analyses represented in this historical data were greater than the stream water quality TVS. The zero values may not truly represent "zero" but may represent, "non-detect," or, "less than," values related to the method detection limits. This issue is demonstrated by comparing the method detection limits specified by the CDPS regulations and recited in CDPS permits to the TVS for in-stream parameter concentrations. With this said, the historic base line water quality must be critically examined before applying in a regulatory context.

C. Determination of Antidegradation Based Average Concentrations

New or increased impacts on Fountain Creek are expected as a result of the proposed LFMSDD WRF because the facility will be a new source to the receiving stream. Therefore, the antidegradation review procedure must continue for all pollutants to determine if impacts are significant. Impacts are deemed to be significant if the calculated assimilative capacity exceeds the calculated antidegradation-based average concentration (ADBAC). ADBACs are calculated using the significant concentration threshold (SCT), which is the additional amount of pollutant above the BWQ concentration that would not cause significant degradation. Section 31.8(3)(c) specifies that the discharge of pollutants should not be considered to result in significant degradation of the reviewable waters if one of the following summarized conditions is met:

- For bioaccumulative toxic pollutants such as mercury, the new or increased loading from the source under review is less than 10 percent of the existing total load to that portion of the segment impacted.
- For all other pollutants
  - The flow rate is greater than 100:1 dilution at low flow; or
  - The new effluent load is less than 15 percent of the remaining assimilative capacity; or
  - Only a temporary change in water quality will result

The SCT for most pollutants equals the BWQ concentration plus 15 percent of the remaining assimilative capacity and is calculated by the following equation:

$$SCT = 0.15 \times (WQS-BWQ) + BWQ$$

Where,

WQS = water quality standard (chronic standard or, in the absence of a chronic standard, the acute standard)

When the BWQ concentration is equal to zero, the following equation results:

$$SCT = 0.15 \times WQS$$

The antidegradation requirements outlined in *The Basic Standards and Methodologies for Surface Water* specify that chronic numeric standards should be used in the antidegradation review. However, where there is only an acute standard, the acute standard should be used. Chronic standards are available for all pollutants except free cyanide and total recoverable trivalent chromium, for which acute standards are available and were used. The data utilized and the calculation of SCTs is presented in Table 12.

Table 12
Significant Concentration Threshold (SCT)
for Parameters Except Ammonia

Parameter	***WQS***	***BWQ***	***SCT***
E. coli	126	37	50.35
Ag, Dis (ug/l)	2.3	0	0.35
As, Trec (ug/l)	100	0	15.00
Cd, Dis (ug/l)	1.0	0.129	0.26
Cr^{+3}, Trec **(acute)** (ug/l)	50	0	7.50
Cr^{+6}, Dis (ug/l)	11	0	1.65
Cu, Dis (ug/l)	24	4.3	7.26
Fe, Trec (ug/l)	1,000	1,810	NA [1)]
Hg, Tot (ug/l)	0.01	0	0.0015
Mn, Dis (ug/l)	2,407	16	374.65
Ni, Dis (ug/l)	136	8.6	27.71
Pb, Dis (ug/l)	8.4	0.38	1.58
Se, Dis (ug/l)	8.0	8.9	NA [1)]
Zn, Dis (ug/l)	327	27	72.00
Cn, Free **(acute)** (ug/l)	5	0	0.75

1) BWQ > WQS, SCT and ADBAC do not apply.

ADBACs are determined by re-calculating the mass-balance equation using the SCT in place of the water quality standard, as in the following equation:

$$ADBAC = \frac{SCT \times Q_3 - M_1 \times Q_1}{Q_2}$$

Where,

Q_1 = Upstream low flow (1E3 or 30E3)
Q_2 = Average daily effluent flow (design capacity)
Q_3 = Downstream flow $(Q_1 + Q_2)$
M_1 = Ambient existing water quality concentration (From Table 4)
SCT = Significant concentration threshold

The ADBACs for pollutants of concern, except ammonia, were calculated and are presented in Table 13. In accordance with the WQCD's *Antidegradation Significance Determination for New or Increased Water Quality Impacts Procedural Guidance*, if the BWQ concentration exceeds the water quality standard, there is no baseline available increment to be protected. In such cases, the ADBAC cannot be calculated. Antidegradation-based limits would not apply since the water quality is already degraded. The WQCD will then further evaluate the waterbody for 303(d) listing. This occurred for two of the pollutants of concern, total recoverable iron and dissolved selenium.

Table 13
Chronic ADBACs for Parameters Except Ammonia

Parameter	Q_1 (cfs)	Q_2 (cfs)	Q_3 (cfs)	M_1	SCT	ADBAC
E. coli (#/100 ml)	58.0	136.6	194.6	15	50.35	65.4
Ag, Dis (ug/l)	58.0	136.6	194.6	0	0.35	0.49
As, Trec (ug/l)	58.0	136.6	194.6	13	15.00	15.8
Cd, Dis (ug/l)	58.0	136.6	194.6	0	0.26	0.37
Cr^{+3}, Trec **(acute)** (ug/l)	32.0	136.6	168.9	2.0	7.50	8.79
Cr^{+6}, Dis (ug/l)	58.0	136.6	194.6	0	1.65	2.35
Cu, Dis (ug/l)	58.0	136.6	194.6	2.7	7.26	9.19
Fe, Trec (ug/l) [1)]	58.0	136.6	194.6	2,740	NA	NA
Hg, Tot (ug/l)	58.0	136.6	194.6	0	0.0015	0.0021
Mn, Dis (ug/l)	58.0	136.6	194.6	43	374.65	515
Ni, Dis (ug/l)	58.0	136.6	194.6	1.0	27.71	39.0
Pb, Dis (ug/l)	58.0	136.6	194.6	0	1.58	2.25
Se, Dis (ug/l) **1)**	58.0	136.6	194.6	5.6	NA	NA
Zn, Dis (ug/l)	58.0	136.6	194.6	15	72.00	96.2
Cn, Free **(acute)** (ug/l)	32.0	136.6	168.6	0	0.75	0.93

1) BWQ > WQS, SCT and ADBAC do not apply.

SCTs for total ammonia were calculated using the SCT equation above that adds 15 percent of the remaining assimilative capacity to the BWQ for ammonia. ADBACs for total ammonia were then calculated by substituting the SCT in place of the chronic standard in the AMMTOX model. For the LFMSDD WRF, this required the use of two modeling procedures, one to account for conditions within Fountain Creek as previously discussed and a second procedure to degrade ammonia for 1.5 miles in the unnamed tributary before its confluence with Fountain Creek. The resulting ADBACs for total ammonia are presented in Table 14. The ADBACs for ammonia are evaluated utilizing the AMMTOX model procedure, which generates monthly ADBACs.

Table 14
ADBACs for Total Ammonia

	Chronic Limit (mg/l)	
Month	**At Confluence [1)]**	**At Point of Discharge [2)]**
January	8.6	14
February	8.1	14
March	8.2	15
April	5.4	10
May	6.0	13
June	7.1	18
July	8.2	27
August	7.8	24
September	6.9	19
October	5.4	13
November	5.8	11
December	7.8	13

1) At the confluence of Unnamed Tributary and Fountain Creek based on protecting the SCT in Fountain Creek
2) At the point of discharge of the LFMSDD WRF to the Unnamed Tributary based on protecting the SCT in Fountain Creek and ammonia reduction in the Unnamed Tributary.

In lieu of being subject to the ADBACs, facilities have the option of selecting non-impact limits (NILs), which are concentration limits based on their existing permitted load and the proposed design flow. By agreeing to meet the NILs, new or increased impacts will not occur and thus ADBACs will not be required to be considered in CDPS permits. For those pollutants for which permit limits have not yet been established, an implicit load allocation is determined and an implicit permit limit is established.

In accordance with the WQCD's *E. coli* policy, an implicit limit for *E. coli* is determined as 0.32 times the permit limit for fecal coliform. For metals and cyanide, implicit limits are determined based on the WQCD's standard procedure that specifies that implicit limits be developed based on the maximum concentration. However, NILs are not an option in this case because the facility is not yet in existence and therefore there are no current permit limits or current permitted loads.

For all pollutants evaluated, a summary of the WQBELs, ADBACs and NILs applicable to the discharge from the proposed LFMSDD WRF are presented in Table 15.

Table 15 WQBELs, ADBACs, and NILs Summary for LFMSDD			
Parameter	**WQBEL**	**ADBAC**	**NIL**
E. coli (#/100 ml)	126	65.4	NA
Ag, Dis (ug/l)	2.5	0.49	NA
As, Trec (ug/l)	100	15.8	NA
Cd, Dis (ug/l)	1.1	0.37	NA
Cr^{+3}, Trec **(acute)** (ug/l)	52.0	8.79	NA
Cr^{+6}, Dis (ug/l)	11.9	2.35	NA
Cu, Dis (ug/l)	25.7	9.19	NA
Fe, Trec (ug/l) [1)]	1,000	NA	NA
Hg, Tot (ug/l)	0.011	0.0021	NA
Mn, Dis (ug/l)	2,597	515	NA
Ni, Dis (ug/l)	147	39.0	NA
Pb, Dis (ug/l)	9.1	2.25	NA
Se, Dis (ug/l)	8.2	NA	NA
Zn, Dis (ug/l)	352	96.2	NA
CN, Free (**acute)** (ug/l)	5.2	0.93	NA
Jan. Total Amm. (mg/l)	>45	14	NA
Feb. Total Amm. (mg/l)	>45	14	NA
Mar. Total Amm. (mg/l)	>45	15	NA
Apr. Total Amm. (mg/l)	31	10	NA
May. Total Amm. (mg/l)	43	13	NA
Jun. Total Amm. (mg/l)	>45	18	NA
Jul. Total Amm. (mg/l)	>45	27	NA
Aug. Total Amm. (mg/l)	>45	24	NA
Sep Total Amm. (mg/l)	>45	19	NA
Oct. Total Amm. (mg/l)	36	13	NA
Nov. Total Amm. (mg/l)	39	11	NA
Dec. Total Amm. (mg/l)	>45	13	NA

1) Ambient in-stream background concentration is higher that water quality standard, so effluent concentration, WQBEL, is set to water quality standard

ADBACs and NILS are not applicable when the new WQBEL is less than the ADBAC. NILS are not applicable when the new WQBEL is less than the NIL. For the pollutants for which ADBACs and NILS apply, if the facility chooses the NIL as the proposed permit limit, the ADBAC would not be applied. These conditions are not applicable to this PEL evaluation.

Additionally, the facility may complete an alternatives analysis, which might result in ADBACs not being applied. ADBACs are typically not applied where an acceptable alternatives analysis is prepared and submitted consistent with Regulation 31.8(3)(d). This alternatives analysis must demonstrate that the achievement of less degrading limits (i.e. ADBACs) is not feasible. This option can be further explored with the WQCD.

VI. Effluent Limitation Regulatory Analysis

Regulation No. 62, the *Regulations for Effluent Limitations,* includes effluent limitations that apply to all discharges of wastewater to State waters, with the exception of storm water and agricultural return flows. These regulations are applicable to the discharge from the proposed LFMSDD WRF. Table 16 contains a summary of these limitations.

Table 16
Specific Limitations for the Discharge of Wastes

Parameters	***7-Day Average***	***30-Day Average***	***Instantaneous Maximum***
BOD_5	45 mg/l	30 mg/l	NA
TSS, mechanical plant	45 mg/l	30 mg/l	NA
TSS, aerated lagoon	110 mg/l	75 mg/l	NA
TSS, non-aerated lagoon	160 mg/l	105 mg/l	NA
BOD_5 Percent Removal	NA	85%	NA
TSS Percent Removal	NA	85%	NA
Total Residual Chlorine	NA	NA	0.5 mg/l
pH	NA	NA	6.0-9.0 su range
Oil and Grease	NA	NA	10 mg/l

Note that the TSS limitations shown above vary based on the type of wastewater treatment processes used at the facility. The *Regulations for Effluent Limitations* waive the 85 percent removal requirement for TSS where waste stabilization ponds, both aerated and non-aerated, are used as the principal process for treating domestic wastes.

In accordance with the WQCD's *E. coli* policy, the WQCD establishes the 7-day geometric mean limit for *E. coli* as two times the 30-day geometric mean limit and also includes maximum limits of 2,000 colonies per 100 ml (30-day geometric mean) and 4,000 colonies per 100 ml (7-day geometric mean).

The BOD_5, TSS and oil and grease concentration limits from Regulation No. 62 are the most stringent effluent limits and therefore apply to this PEL evaluation. Likewise, the BOD_5 and TSS percent removal requirements from Regulation No. 62 are also applicable to this PEL evaluation. The pH limits specified in Regulation No. 62 do not apply to this PEL evaluation since the water quality standard for pH in stream segments COARFO04 and COARFO02a of 6.5 to 9.0 su is more stringent.

As previously discussed, there are no in-stream standards for chlorine in the unnamed tributary to which the proposed LFMSDD WRF will discharge (Stream Segment COARFO04). While the mainstream of Fountain Creek (Stream Segment COARFO02a) does have both chronic and acute standards for chlorine, it is expected that any chlorine discharged from the proposed LFMSSD WRF will dissipate by the time it reaches Fountain Creek. Therefore, the total residual chlorine (TRC) concentration limit from Regulation No. 62 is the most stringent effluent limit and will apply to this PEL evaluation.

VII. Preliminary Effluent Limits

The potential PELs reflected in Table 17 include the consideration of the following:

- Assimilative capacities as discussed in the technical analysis contained in Section IV
- ADBACs as discussed in the antidegradation review provided in Section V
- NILs are not applicable as discussed in Section V
- Effluent limits prescribed by the regulations based on the regulatory analysis provided in Section VI.

Table 17
Proposed LFMSDD WRF
Preliminary Effluent Limits

BOD_5 (mg/l)	45 (7-day average), 30 (30-day average)		
BOD_5 (% removal)	85 (30-day average)		
TSS, mechanical plant (mg/l)	45 (7-day average), 30 (30-day average)		
TSS, mechanical plant (% removal)	85 (30-day average)		
Oil and Grease (mg/l)	10 (maximum)		
pH (s.u.)	6.5-9.0 (minimum-maximum)		
Other Pollutants	***WQBELs***	***ADBACs***	***NILs***
E. Coli (#100 ml)	252 (7-day geomean), 126 (30 day geomean)	65.4 (2-yr Avg.)	NA
TRC (mg/l)	0.5 (daily maximum)	NA	NA
Metals and Cyanide	***WQBELs***	***ADBACs***	***NILs***
Ag (dis) (ug/l)	15 (daily Max.), 2.5 (30-day Avg.)	0.49 (2-yr Avg.)	NA
As (trec) (ug/l)	100 (30-day Avg.)	15.8 (2-yr Avg.)	NA
As (dis) (ug/l)	354 (daily Max.)	NA	NA
Cd (dis) (ug/l)	7.7 (daily Max.), 1.1 (30-day Avg.)	0.37 (2-yr Avg.)	NA
Cr^{+3} (trec) (ug/l)	52 (daily Max.)	8.8 (2-yr Avg.)	NA
Cr^{+6} (dis) (ug/l)	17 (daily Max.), 11.9 (30-day Avg.)	2.4 (2-yr Avg.)	NA
Cu (dis) (ug/l)	41 (daily Max.), 26 (30-day Avg.)	9.2 (2-yr Avg.)	NA
Fe (trec) (ug/l)	1,000 (30-day Avg.)	NA	NA
Hg (tot) (ug/l)	0.011 (30-day Avg.)	0.0021 (2-yr Avg.)	NA
Mn (dis) (ug/l)	4,543 (daily Max.), 2,597 (30-day Avg.)	515 (2-yr Avg.)	NA
Ni (dis) (ug/l)	1,276 (daily Max.), 147 (30-day Avg.)	39 (2-yr Avg.)	NA
Pb (dis) (ug/l)	226 (daily Max.), 9.1 (30-day Avg.)	2.3 (2-yr Avg.)	NA
Se (dis) (ug/l)	19 (daily Max.), 8.2 (30-day Avg.)	NA	NA
Zn (dis) (ug/l)	393 (daily Max.), 352 (30-day Avg.)	96 (2-yr Avg.)	NA
CN (free) mg/l)	5.2 (daily Max.)	0.93 (2-yr Avg.)	NA
Total Ammonia	***WQBELs (mg/l)***	***ADBACs (mg/l)***	***NILs***
January	Report (daily Max.) Report (30-day Avg.)	14 (2-yr Avg.)	NA
February	Report (daily Max.) Report (30-day Avg.)	14 (2-yr Avg.)	NA
March	Report (daily Max.) Report (30-day Avg.)	15 (2-yr Avg.)	NA
April	Report (daily Max.) 31 (30-day Avg.)	10 (2-yr Avg.)	NA
May	Report (daily Max.) 43 (30-day Avg.)	13 (2-yr Avg.)	NA
June	Report (daily Max.) Report (30-day Avg.)	18 (2-yr Avg.)	NA
July	Report (daily Max.) Report (30-day Avg.)	27 (2-yr Avg.)	NA
August	Report (daily Max.) Report (30-day Avg.)	24 (2-yr Avg.)	NA
September	Report (daily Max.) Report (30-day Avg.)	19 (2-yr Avg.)	NA
October	Report (daily Max.) 36 (30-day Avg.)	13 (2-yr Avg.)	NA
November	Report (daily Max.) 39 (30-day Avg.)	11 (2-yr Avg.)	NA
December	Report (daily Max.) Report (30-day Avg.)	13 (2-yr Avg.)	NA

Note that water quality based effluent limitations (WQBELs) for ammonia were not necessary for this facility because the assimilative capacity of the receiving water, as discussed in Section IV, is large enough to establish total ammonia effluent concentrations for all months at greater than 30 mg/l. Because treated domestic wastewater effluent is not expected to have a total ammonia concentration greater than 30 mg/l, no additional allocations are provided as per WQCD standard procedure.

VIII. References

Preliminary Effluent Limits, Appendix A, Clover Ditch and Fountain Creek, Proposed Rehabilitation and Improvements to US Army - Fort Carson WWTF, WQCD, August 19, 2008.

Preliminary Effluent Limits, Fountain Creek, LFMSDD WWTF, WQCD, October 19, 2004.

Classifications and Numeric Standards for Arkansas River Basin, Regulation No. 32, CDPHE, WQCC, effective August 30, 2008.

The Basic Standards and Methodologies for Surface Water, Regulation 31, CDPHE, WQCC, effective May 31, 2008.

Antidegradation Significance Determination for New or Increased Water Quality Impacts, Procedural Guidance, CDPHE, WQCD, December 2001.

Memorandum Re: First Update to [Antidegradation] Guidance Version 1.0, CDPHE, WQCD, April 23, 2002.

Regulation No. 32 Prehearing Statement 2007 Fountain Creek Rationale, WQCD-Exhibit 2, CDPHE, WQCD, April 3, 2007.

Policy Concerning Escherichia coli versus Fecal Coliform, CDPHE, WQCD, July 20, 2005.

Water-Quality-Limited Segments Requiring Total Maximum Daily Loads, Regulation 93, CDPHE, *WQCC, effective April 30,2008*.

Colorado's Monitoring and Evaluation List, Regulation 94, CDPHE, WQCC, effective April 30, 2008

Regulations for Effluent Limitations, Regulation 62, CDPHE, WQCC, March 30,2008.

Colorado Mixing Zone Implementation Guidance, CDPHE, WQCD, April 2002.

WQP-23 Procedures for Conducting Assessments for Implementation of Temperature Standards in Discharge Permits, CDPHE, WQCD, Permits Section, July 3, 2008.